

CLAIMS:

1. Apparatus for controlling a digital television display, the apparatus comprising:
a main processor;
a main memory coupled to said main processor via address and data busses, the main memory being arranged to store at least temporarily video data for display, and on-screen display graphics for overlaying on video data;
mixing means for mixing video data read from the main memory under the control of the main processor, with on-screen display graphic data;
at least one line buffer for storing a line of on-screen display graphic data; and
hardware processing means for composing a line of on-screen display graphic data in the line buffer by reading appropriate on-screen display graphic data from said main memory and writing it to the line buffer, and for providing the composed line of data to said mixing means.
2. Apparatus according to claim 1, the apparatus comprising at least two line buffers, one of the buffers being written to by said hardware processing means whilst the other is being read from.
3. Apparatus according to claim 1 and comprising a first memory for storing a list of on-screen display objects and a second memory for storing object descriptors, each entry in said list pointing to an object descriptor, and each descriptor specifying a bitmap stored in said main memory.
4. Apparatus according to claim 3, the main processor being arranged to load into the first and second memories, for each frame to be displayed, object and descriptor data for that frame, and, based upon the contents of the first and second memories, said hardware processing means is arranged to read appropriate on-screen display graphic data from said main memory and writes it to the line buffer.
5. Apparatus according to claim 4, said hardware processing means being arranged to load background fill colour data into locations of the line buffer in dependence upon descriptor data contained in said second memory.

6. Apparatus according to claim 1, wherein said main processor, said line buffer(s), and said hardware processing means are integrated onto a single chip, with the main memory being provided on a separate device.
7. A method of controlling a digital television display, the method comprising:
 - in a main memory controlled by a main processor, storing at least temporarily video data for display, and on-screen display graphics for overlaying on video data;
 - composing a line of on-screen display graphic data in a line buffer by reading appropriate on-screen display graphic data from said main memory and writing it to the line buffer; and
 - reading data from the line buffer and mixing the read data with video data read from the main memory.
8. A method according to claim 7, wherein said on-screen display graphics comprise one or more objects, each represented by a corresponding bitmap.
9. A method according to claim 7 and comprising loading an object list into a first random access memory, the list defining objects to be displayed in a display frame, and loading a descriptor list into a second random access memory, the descriptor list defining bitmap characteristics and main memory storage locations, where entries in the object list point to entries in the descriptor list.
10. A method according to claim 9, wherein, for a given frame, the contents of the first and second memories are inspected to determine which on-screen display graphics data should be loaded into the line buffer, on a line-by-line basis.
11. A method according to claim 10, comprising comparing the vertical extent of each graphic or object with the vertical location of the line currently under construction in the line buffer, and, if the graphic contributes to the current line, the corresponding line data for the graphic is read from the main memory to the line buffer.

12. A method according to claim 7, where graphic data is stored in the main memory in RGB colour space, the data being converted to YcrCb colour space prior to writing it to the line buffer.

13. A method according to claim 7, where graphic data is stored in the main memory in 4:4:4 colour resolution, and data read from the line buffer is converted into 4:2:2 colour resolution prior to mixing with video data.